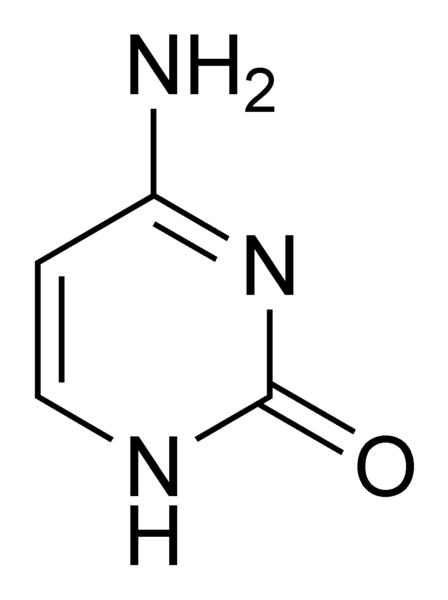
1. Which of the following is the level of phosphorylation at which ribonucleotides are converted to deoxyribonucleotides? What is the cofactor?
2. Monophosphate, adenoredoxin
3. Diphosphate, thioredoxin
4. Triphosphate, thioredoxin
5. Both C and D
6. Which of the following nucleotides allosterically inhibit ribonucleotidereductase at the **substrate specificity site**?
7. dATP
8. dTTP
9. dUTP
10. dGTP
11. dCTP
12. Both B and D
13. Which of the following is the **first pyrimidine nucleotide** that is formed during *de novo* pyrimidine biosynthesis?
14. AMP
15. CMP
16. UMP
17. OMP
18. TMP
19. Which of the following enzyme is regulated early in the de novo pyrimidine biosynthesis**by UTP**?
20. CarbamoylPhophateSynthetase
21. AsparatateTranscarbamoylase
22. Dehydroorotase
23. Dihidroorotate dehydrogenase
24. Which of the following bases can be converted back to nucleotides by using **phosphoribosyltransferase** as one of the salvage pathway?
25. Adenine, Cytosine, and Guanine
26. Adenine, Guanine, and Uracil
27. Uracil and Thymine
28. Guanine and Uracil
29. Which of the following base can be used to treat OroticAciduria?
30. Adenocine
31. Uridine
32. Guanosine
33. Thymidine
34. Which of the following enzyme is inhibited by 5-fluorouracil (5-FU)?
35. Ribonucleotidereductase
36. CTP synthetase
37. Orotidylic acid decarboxylase
38. Thymidylate synthase
39. Carbamoyl phosphate synthetase
40. Which of the following is the catabolism product of Thymine?
41. Beta-Alanine
42. Beta-Aminoisobutyrate
43. Alpha-Alanine
44. Alpha-Aminoisobutyrate
45. Which of the following THF is used in de novo purine synthesis?
46. N10formyl N4folate
47. N5N10formyl N4folate
48. N5formyl N4folate
49. N5N10methyl N4folate
50. Which of the following is the commonly ingested form of B12?
51. CN(cyano) - B12
52. OH(hydroxyl) - B12
53. CH3(methyl) - B12
54. 5’ deoxyadenosyl - B12
55. Which of the following form of B12  is found in the liver?
56. Bound to Transcobalamin I
57. Bound to Transcobalamin II
58. Bound to intrinsic factor
59. Bound to R-binder
60. Which of the following deficiency lead to buildup of homocysteine?
61. Deficiency in 5-formyl THF
62. Deficiency in 5-methyl THF
63. Deficiency in 10-formyl THF
64. Deficiency in 10-methyl THF
65. Deficiency in 5,10-methylene THF
66. Which of the following histones serve as linker to contribute to histone octamer?
67. H1
68. H2A
69. H2B
70. H3
71. H4
72. Which of the following is the correct pair for an enzyme and its product?
73. RNA Polymerase I – hn RNA
74. RNA Polymerase II – rRNA
75. RNA Polymerase II – mRNA
76. RNA Polymerase III - siRNA
77. Which of the following drugs inhibit RNA polymerase in both prokaryotes and eukaryotes?
78. Rifampicin
79. Alpha-Amanitin
80. Actinomycin C
81. Actinomycin D
82. Beta-Amanitin
83. Which of the following is a factor for termination of transcription in prokaryotes?
84. Sigma factor
85. Beta factor
86. Rho protein
87. Alpha protein
88. Pribnow Box
89. What is the effect of 1,6 Allolactose in the transcription of lac operon?
90. Reduce transcription of lac operon
91. Induce transcription of lac operon
92. Inhibit transcription of lac operon
93. Silence transcription of lac operon
94. Which end of eukaryotic mRNA is capped with methylguanylate?
95. 3’- end
96. 7’-end
97. 5’-end
98. 2’-end
99. Which of the following enzymes are inhibited in translation by diphtheria toxin?
100. AminoacyltRNA
101. GDP
102. Initiation complex
103. eEF2
104. Which of the following enzymes are inhibited in translation by tetracycline?
105. AminoacyltRNA at P site
106. AminoacyltRNA at E site
107. AminoacyltRNA at A site
108. Works as AminoacyltRNA analog
109. Which of the following enzyme mediates hydrolysis of GTP to give energy for releasing tRNA and release factor during termination of translation in Eukaryotes?
110. eEF-2
111. aminoacyltransferase
112. Kozak
113. 40S ribosome
114. peptidyltransferase
115. Which of the following is the correct composition of small subunit of Eukaryotic ribosome?
116. 60S, 34 protein, 16S rRNA
117. 40S, 32 pretines, 18S rRNA
118. 40S, 34 pretines, 18S rRNA
119. 40S, 34 pretines, 28S rRNA
120. How is protein degradation by ubiquination characterized?
121. ATP-Independent
122. ATP-dependent
123. Glycosylation
124. Membrane-anchoring
125. At which site of mRNA does tRNA form new peptide bond during elongation?
126. P site
127. E site
128. A site
129. T-site
130. Which of the following is not a criteria for screening inborn errors of metabolism?
131. Low cost of screening method
132. low false positive false negative rate
133. sufficiently low incidence and prevalence rate
134. early treatment is crucial
135. treatable disorders
136. Which of the following treatment can be applied to retard neurological degeneration in lysosomal storage diseases?
137. Enzyme Replacement Therapy
138. Human Stem Cell Therapy
139. Vitamin B6
140. Vitamin B12
141. Aspartame
142. Which of the following categories od diseases is not optimized by Mass Spectrometry analysis?
143. Amino acidemias
144. Fatty acid oxidation disorders
145. Lysosomal storage disorders
146. Organic acidemias
147. Which of the following is **not** an indication for organic acidemias?
148. Abundance of specific acylcarnitines
149. Hyperammonemia
150. Lethargy
151. Low anion gap
152. vomiting
153. Which of the following is seen in urea cycle defects?
154. Low pH, low Ammonia
155. Low pH, high ammonia
156. High pH, low ammonia
157. High pH, high ammonia
158. Which of the following enzyme is defective in Severe Combined Immune Deficiency Syndrome (SCID)?
159. Guanine deaminase
160. Uracinedeaminase
161. Adenosine deaminase
162. Thymine diaminase
163. Which of the following enzyme is used during insertion of DNA fragments in recombinant plasmid construction?
164. S4 DNAligase
165. T2 DNA ligase
166. T4 DNA ligase
167. T3 DNA ligase
168. Which of the following is not a component of a commercially available cloning vector?
169. Polylinker
170. Origin of replication
171. cDNA
172. drug resistance gene
173. Which of the following is NOT the reason why SCID was chosen first for gene therapy?
174. Fatal due to immune deficiency
175. Could be corrected by enzyme therapy (PEG-ADA)
176. Lymphocytes with ADA outgrow deficient lymphocytes
177. Multiple gene defect
178. Which of the following is the mechanism of Herpes Simplex Virus thymidine kinase gene (HSV-tk) when it is used for cancer gene therapy?
179. HSV-tk dephosphorylates acycloguanosine, which gets incorporated into DNA, and function as a DNA chain initiater
180. HSV-tk dephosphorylates acycloguanosine, which gets incorporated into DNA, and function as a DNA chain terminater
181. HSV-tk phosphorylates acycloguanosine, which gets incorporated into DNA, and function as a DNA chain terminater
182. HSV-tk does not phosphorylate acycloguanosine, which doe not get incorporated into DNA
183. Which of the following is the mechanism of MHC genes in cancer gene therapy?
184. Replacement of mutant suppressor genes with their normal counterpart
185. Pro-drug activating enzymes that convert a nontoxic compound to a toxic metabolite
186. Pro-drug activating enzymes that convert a toxic compound to a nontoxic metabolite
187. Stimulation of immune responses against the tumor using cytokine
188. Which of the following gene encodes a small GTP-binding protein, which serve as molecular “on-off” switches for downstream molecules?
189. Bcl2
190. Ras
191. Abl
192. Myc
193. RB1
194. Which of the following is the mechanism for hereditary nonpolyposis colon cancer (HNPCC)?
195. Activated MSH2, MLH1 mismatch genes
196. Mutations in MSH2, MLH1, mismatch genes
197. Mutations in MSH2, MLH1, mismatch repair genes
198. Mutations in HER2,NEU tyrosine kinase-oncogene
199. Point mutation in APC gene
200. Which of the following is the mechanism of BRCA1 gene product?
201. Involved in the response to DNA damage and is phosphorylated by the ATM protein
202. Gene products are often amplified
203. Promote estrogen synthesis
204. Promote estrogen receptor synthesis
205. Identify the following base.



1. Uracil
2. Thymine
3. Adenine
4. Cytosine
5. Guanine
6. What is the cytosine content of this DNA sequence?

5’\_ A \_ \_ \_ A \_ \_ \_ \_ 3’

3’\_ \_ A \_ \_ \_ \_ A \_ \_ 5’

1. 10%
2. 20%
3. 30%
4. 35%
5. 40%
6. Which of the following form od DNA is left handed and has the smallest diameter?
7. A form
8. B form
9. C form
10. D form
11. Z form
12. Which of the following is the interaction of TATA binding protein (TBP) and DNA?
13. Major groove binding
14. Minor groove binding
15. Base-stacking
16. Tetraplex (G4) DNA binding
17. Which of the following disease is associated with mutations in a helicase, and present accelerated aging, cataracts, and “bird like” facial appearance(nasal bridge pinched)?
18. Bloom’s syndrome
19. Werner’s Syndrome
20. Rothmund-thomson syndrome
21. Xerodermapigmentosum
22. Which of the following component of DNA corresponds to (CGG)nrepeats in Fragile X syndrome?
23. 5’-UTR
24. TR-exon
25. Intron
26. 3’-UTR
27. Promoter
28. Which of the following component of DNA corresponds to (CAG)nrepeats in Huntington’s Disease?
29. 5’-UTR
30. TR-exon
31. Intron
32. 3’-UTR
33. Promoter
34. Which of the following ddNTP nucleoside analogues inhibits topoisomerase I?
35. Acycloguanosine (Acyclovir)
36. Azido-thymidine (AZT)
37. Cutosinearabinoside (AraC, cytarabine)
38. Cisplatin
39. Which of the following topoisomerase cleaves both strands of the DNA duplex and induces ATP-dependent negative supercoiling?
40. Type I topoisomerase
41. Type II topoisomerase
42. Type III topoisomerase
43. Camptothesins
44. Which of the following Eukaryotic DNA polymerase lacks 3’-5’ exonuclease activity?
45. Pol δ
46. Pol α
47. Pol ε
48. Pol θ
49. Pol ψ
50. Which of the following diseases have defects in ATM gene, loss of DNA damage signaling?
51. Fanconi Anemia
52. Pernecious Anemia
53. Hereditary nonpoluposis colorectal cancer
54. Ataxia telangiectasia
55. Xerodermapigmentosum
56. Which of the following diseases have defects in chromosomal instability, and crosslink DNA repair?
57. Fanconi Anemia
58. Pernecious Anemia
59. Hereditary nonpoluposis colorectal cancer
60. Ataxia telangiectasia
61. Xerodermapigmentosum
62. Which of the following bind both major and minor groove of DNA?
63. Netropsin
64. Mitomycin C
65. Hoechst 33258
66. Bisdaunomycin
67. Cro Protein (λ phage)
68. What is the effect of higher GC content of DNA on Tm, melting temperature (DNA stability)?
69. Decrease Tm
70. Increase Tm
71. No change in Tm
72. Which of the following stage in Meiosis I prophase I present crossing-over between non-sister chromatids?
73. Leptotene
74. Zygotene
75. Pachytene
76. Diplotene
77. Diakinesis
78. How many chromosomes and chromatids are present during Anaphase II and Telophase II?
79. 46 chromosomes, 46 chromatids
80. 46 chromosomes, 23 chromatids
81. 23 chromosomes, 23 chromatids,
82. 46 chromosomes, 92 chromatids
83. Which of the following cells secrete fructose-rich testicular fluid, androgen binding protein, inhibin, anti-mullerian hormone?
84. Sertoli cells
85. Spermatids
86. Leydig cells
87. Oocytes
88. What happens ~18-21 hours after gamete fusion during first cleavage division?
89. 2 sets of haploid chromosomes each surrounded by pronuclei
90. cortical granules release their contents into the perivitelline space
91. first mitotic division occurs, pronuclear membrane breaks down, metaphase spindle forms, cleavage furrow forms to form two-cell embryo
92. acrosindigents the zonapellucida, the spermatozoon penetrate to the perivitelline space
93. Which of the following types of chromosomes in humans present Satellite, p <<< q.
94. Acrocentric
95. Metacentric
96. Submetacentric
97. All of the above
98. Which of the following chromosome banding cause bright G bands (GC rich) correspond with dark Q-bands?
99. Q-bands
100. G-bands
101. R-bands
102. T-bands
103. C-bands
104. NOR
105. Which of the following best describes chromosome 5?
106. Group A, metacentric
107. Group C metacentric
108. Group B metacentric
109. Group B submetacentric
110. Group C, submetacentric
111. Group D, submetacentric
112. Which of the following best describes X chromosome ?
113. Group A, metacentric
114. Group C metacentric
115. Group B metacentric
116. Group B submetacentric
117. Group C, submetacentric
118. Group D, submetacentric
119. Which of the following is NOT a characteristic of Philadelphia Chromosome?
120. ABL1 gene in the vicinity of BCR gene
121. Translocation between 9q and 22q
122. Translocation between 14q and 22q
123. translocation
124. Which of the following trait present horizontal pattern (i.e. skips generations) of inheritance?
125. X-linked
126. Y-linked
127. Autosomal Dominant
128. Autosomal Recessive
129. Which of the following trait present manifesting carriers?
130. X-linked recessive
131. X-linked dominant
132. Y-linked
133. Autosomal Dominant
134. Autosomal Recessive
135. Which of the following term describes non-allelic gene-gene interactions that modify expression of a trait?
136. pleiotropy
137. penocopy
138. mosaiacism
139. epistatis
140. geneticfeterogeneity
141. Which of the following individuals have a higher relative risk?
142. Offspring of affected probands of the higher frequently affected sex
143. Offspring of affected probands of the less frequently affected sex
144. Offspring of unaffected probands of the higher frequently affected sex
145. Offspring of unaffected probands of the less frequently affected sex
146. When environmental variability is increased, what would happen to heritability?
147. Increase heritability
148. Decrease heritability
149. No change in heritability
150. Increase genetic variability
151. Which of the following factors does PKU, phenylketonuria present?
152. Allelic heterogeneity
153. Locus heterogeneity
154. Pleiotropy
155. Phenocopy
156. A and C
157. B and D
158. Which of the following describes sex-influenced traits?
159. Appearance of certain features in only one sex
160. Mode of trait’s expression modified by gender of individual
161. Mutation in one gene has multiple manifestations in different tissues
162. Environmental influences result in a phenotype that mimics a genetic disease or disorder
163. Which of the following is NOT a requirement for Hardy-Weinberg Equilibrium?
164. Random mating
165. Selection
166. No migration
167. No mutation
168. Infinitely large population
169. Which of the following describes sickle cell and Malaria incidence?
170. Homozygous advantage
171. Heterozygous advantage
172. Reproductive fitness
173. Founder effect
174. Bottle-neck
175. What is the coefficient of inbreeding of children (F) for second-degree relatives (uncle-niece)?
176. ½ (0.5)
177. ¼ (0.25)
178. 1/8 (0.125)
179. 1/16 (0.0625)
180. Achondroplasic dwarves will have roughly 30% of the number of offspring, compared to those of normal stature, what is the coefficient of selection?
181. 0.3
182. 30
183. 0.7
184. 70
185. 0.8
186. 0.2
187. Given a disease frequency of 1/10,000 for a dominant, monogenic trait in a population that is in Hardy-Weinberg Equilibrium, what is the frequency of carriers for this disease in this population?
188. 0.01
189. 0.02
190. 0.03
191. 0.04
192. 0.99
193. What is the most likely distance between Rh locus if the highest Lod score in Family 1 is 5.57, which corresponds to θ = 0.20?
194. 10 cM
195. 20 cM
196. 20M
197. 0.20 cM
198. What is the recombination fraction ratio for unlinked haplotypes?
199. 0
200. 1
201. 0.5
202. 0.2
203. 0.3
204. Which of the following is the mechanism for formation of uniparentalheterodisomy?
205. Trisomic rescue
206. Error in meiosis I
207. Error in meiosis II
208. Error in mitosis
209. Both A and B
210. Both A and C
211. Which of the following is the mechanism for formation of uniparentalisodisomy?
212. Trisomic rescue
213. Error in meiosis I
214. Error in meiosis II
215. Error in mitosis
216. Both A and B
217. Both A and C
218. Which of the following defines paternal imprinting?
219. Phenotypic effects of an allele are not expressed (silenced) when inherited from mother
220. Phenotypic effects of an allele are not expressed (silenced) when inherited from father
221. Phenotypic effects of an allele are expressed when inherited from father
222. Which of the following syndrome is described by molecular etiology of maternal deletion of 15q and paternal UPD for chromosome 15?
223. Prader-Willi syndrome
224. Angelmensundrome
225. Cystic fibrosis
226. Transient neonatal diabetes
227. Which of the following diseases is most commonly manifested by mutation of deltaF508?
228. Cystic Fibrosis
229. Hereditary Hemochromatosis
230. Duchenne Muscular Dystrophy
231. Osteogenesisimperfecta
232. Which of the following disease is caused by dominant negative mutation?
233. Cystic Fibrosis
234. Hereditary Hemochromatosis
235. Duchenne Muscular Dystrophy
236. Osteogenesisimperfecta
237. Which of the following trait is the mode of factor V leiden thrombophilia inheritance?
238. Autosomal Recessive
239. Autosomal Dominant
240. X-linked recessive
241. X-linked dominant
242. Mutation in which end of type I procollagen cause major disturbance in OsteogenesisImperfecta (Type II)?
243. N-terminus
244. C-terminus
245. α1 – chains
246. α2 – chains
247. Which of the following describe DMD, duchenne muscular dystrophy?
248. In-frame mutation, production of modified, partially functional dystrophin protein
249. In-frame mutation, absence of dystrophin protein
250. Frameshift mutation, absence of dystrophin protein
251. Frameshift mutation, production of modified, partially functional dystrophin protein
252. Which of the following is not a drug target of phase I metabolism?
253. CYP2D6
254. CHE1
255. CYPC19
256. NAT2
257. CYPC9
258. Which of the following reaction is NOT considered as phase I reaction?
259. Oxidation
260. Reduction
261. Acetylation
262. Hydrolysis
263. Which of the following is a drug transporter
264. NAT2
265. TPMT
266. CYP2D6
267. ABCB1
268. ADRB1
269. Which of the following genotype can be used for a personalized medicine by altering dosing schedule to improve how the drug is metabolized?
270. CYP2C19
271. ADRB1
272. EGFR
273. TMPT
274. CYP2D6